

SYNOPSIS OF THE MEXICAN SPECIES OF CARDIOCHILES NEES

(Hymenoptera, Braconidae)

BY YING-TOU MAO

University of California, Berkeley

The Mexican species of *Cardiochiles* were first treated by Cresson in 1873, five species being described; and Szépligeti in 1902 described another species from Mexico. Including the two new species here described there are, therefore, eight Mexican species known to science. They may be separated by the following table:

1. Eyes bare2
- Eyes hairy3
2. Head, thorax, abdomen and legs entirely black.....*noctis*, new sp.
- Thorax in part, abdomen entirely, and legs more or less red
.....*bicolor* (Szépligeti)
3. Head and thorax more or less yellowish or ferruginous.....4
- Head and thorax entirely black.....5
4. Stigma brownish-yellow; wings yellowish; coxae yellow, posterior parts with black markings; scape lemon-yellow; face punctate*ornatus* (Cresson)
- Stigma blackish; wings dark fuliginous; coxae black; scape black; face smooth and polished.....*thoracicus* (Cresson)
5. Wings hyaline on basal half, fuliginous on apical half.....
-*mexicanus* (Cresson)
- Wings entirely fuliginous6
6. Malar furrow about as long as the basal width of the mandible; hind femora and tibiae red.....*longimala*, new species
- Malar furrow not nearly as long as the basal width of the mandible; hind femora and tibiae black.....7
7. Fore tarsus and middle tarsus with fifth segment longer and thicker than the second; fore femur and tibia largely black
.....*aethiops* (Cresson)
- Fore tarsus with second and fifth segments about equal; middle tarsus with second segment longer than the fifth; fore femur and tibia largely brownish-yellow.....*orizabae* (Cresson)

CARDIOCHILES AETHIOPS (CRESSON), new combination

Toxoneuron aethiops Cresson, 1873, *Canad. Ent.*, 5:66-67, ♀.

The following redescription is from the type.

Female. Length 5.5 mm. Black; pedicel, fore femur and fore tibia apically, and last four segments of fore tarsus yellowish brown; wings fuliginous. *Head.* Antennæ incomplete; scape and pedicel with slightly longer pubescence than the flagellum; eyes hairy; ocelli elevated, the distance between the two posterior ocelli slightly longer than that between either of these and the anterior ocellus, and the area around them depressed; vertex smooth and shining; frons impressed, smooth, shining and with a low median longitudinal carina; face smooth, shining and with a short median tubercle above; clypeus smooth, shining and notched on the apical margin medially; temple narrower than the eye in dorsal view; galea short. *Thorax.* Lateral face of pronotum wrinkled medially; notaulices foveolate; mesopleuron smooth and shining, upper groove rugose in middle portion, lower groove weakly foveolate, the posterior groove foveolate with a smooth impression from the middle leading anteriorly to the lower groove; metapleuron rugose, median ventral part of its anterior portion plain; propodeum rugose, carinae distinct and high, areola diamond-shaped, spiracle ovate and situated before the middle of the spiracular area. First abscissa of radius thicker and longer than that of basal vein; third and fourth abscissae of cubitus about equal; second abscissa of cubitus and recurrent vein about equal; interanal vein represented by a pigmented line. Fifth segment of fore leg longer and thicker than second or third; middle leg also with the fifth tarsal segment longer and thicker than the second or third, and tibial spur about as long as the basitarsus; apex of hind tibia not thickened, tibial spur about three-fourths as long as the basitarsus which is shorter than the remaining four segments combined, second tarsal segment slightly longer than the fifth and the third shorter than the fifth, hind claws pectinate basally. *Abdomen.* First abdominal suture extending obliquely forward laterally; second tergite slightly shorter than the third medially; hypopygium about as long as the second and third tergites combined, plowshare-shaped; ovipositor sheath about as long as the first two segments of hind tarsus combined, pubescent.

The type female, the only known specimen, is from CORDOVA, MEXICO (Academy of Natural Sciences of Philadelphia).

CARDIOCHILES BICOLOR (Szépligeti), new combination

Toxoneuron bicolor Szépligeti, 1902. Term. Füzet., 25:78, ♀.

The following is simply a translation of the original description.

Smooth; head transverse, maxillary palpi 5-, labial palpi 4-segmented; ocelli not located on summit of vertex; eyes bare, occiput not margined and only slightly excavated. Antenna 42-segmented, third segment as long as the obovate scape. Mesonotum

divided; median lobe broad, not prominent. Propodeum pubescent, areolate. First intercubitus angled, without stump of a vein; third abscissa of radius weakly marked, transparent and arching almost bowlike to the wing tip; anal cell divided; radial cell of hind wing not divided. The longer spur of hind tibia half as long as the metatarsus; tarsal segments 2-5 much more slender than the first. First abdominal segment shorter than its apical width, almost triangular, strongly narrowed anteriorly, with two longitudinal furrows defining a triangular area; following segments transverse and of about equal length; hypopygium large.

Black; mesothorax (except median lobe), scutellum, femur of hind leg, the tibiae (tip of posterior tibia brown), tarsi of fore and middle legs and abdomen, red. Wings brown, stigma dark. Length 9 mm., ovipositor sheath short, wedge-shaped. Mexico.

Type in the Hungarian National Museum, Budapest.

Cardiochiles longimala, new species

Male. Length 5.5 mm. Black; fore femur except base, apical half of middle femur, hind femur, and tibiae except inner apex of hind tibia, ferruginous; tibial spurs dark and those of hind leg dark ferruginous. *Head*. Antenna 35-segmented; scape and pedicel with longer pubescence than the flagellum; eye hairy; ocelli slightly elevated and the distance between two posterior ocelli longer than that between either one of these and the anterior ocellus; vertex smooth, shining, and slightly sloping toward frons; frons impressed, smooth, shining, and with a low median longitudinal carina; face smooth, shining, with a low median tubercle above and the median line below slightly elevated; clypeus smooth, slightly shorter than the face, its apical margin notched medially; malar furrow slightly shorter than the basal width of the mandible; temple and eye of about equal width in dorsal view; galea moderate, not conspicuously long. *Thorax*. Lateral face of pronotum medially rugose; notaulices distinct, smooth; mesopleuron smooth and shining, upper groove finely rugose, lower groove finely foveolate, posterior groove foveolate with a smooth curved groove from the middle leading anteriorly to the lower groove; metapleuron rugose, median ventral part of its anterior portion smooth and shining; propodeum rugose, transverse carina low, the other carinae moderately high, spiracle ovate. First abscissa of radius longer and thicker than that of basal vein; fourth abscissa of cubitus slightly less than twice as long as the third; second abscissa of cubitus and recurrent vein about equal; interanal vein represented by a pigmented line. Fifth segment of fore tarsus longer than the second; inner spur of middle tibia about three-fourths as long as the basitarsus, second segment of middle tarsus longer than the fifth which is about equal to the third; apex of hind tibia not thickened, inner spur slightly over half as long as the basitarsus, basitarsus about as long as the next three

tarsal segments combined, second tarsal segment longer than the third and third longer than the fifth, hind tarsal claws pectinate basally. *Abdomen*. First abdominal suture extending obliquely forward laterally; an oblique groove on each side of the second tergite halfway between median line and the margin; third tergite about 1.50 times as long as the second.

Type. Male, GUADALAJARA, MEXICO, August 2, 1914 (U. S. National Museum, No. 57295). This species is very similar to *C. floridanus* (Ashmead) except for the longer malar space.

CARDIOCHILES MEXICANUS (CRESSON), new combination

Toxoneuron mexicanum Cresson, 1873. *Canad. Ent.*, 5:66-67, ♀ ♂.

The following redescription is from the type.

Female. Length 7 mm. Black, a spot on outer upper orbit yellowish-brown; about apical 0.40 of fore wing and tip of hind wing fuliginous. *Head*. Antennae incomplete; scape and pedicel with longer pubescence than the flagellum; eye hairy; ocelli slightly elevated, the distance between the two posterior ocelli longer than that between one of these and the anterior ocellus; vertex slightly sloping toward frons, smooth, shining, and about as long as frons; frons impressed, smooth, shining, and with a low median longitudinal carina; face shining, with a short median tubercle above, and the median line slightly elevated; clypeus shining, plain, notched on apical margin medially; temple and eye of about equal width in dorsal view; galea short. *Thorax*. Lateral face of pronotum weakly rugose medially; notaulices foveolate, distinct and deep; mesopleuron smooth and shining, upper groove flat, weakly rugose, lower groove foveolate, and posterior groove foveolate with a smooth groove from the middle leading anteriorly to the lower groove; metapleuron rugose, median ventral part of its anterior portion shining and plain; propodeum rugose, carinae moderately high, spiracle transverse. First abscissa of radius slightly longer than that of basal vein; fourth abscissa of cubitus about 1.30 times as long as third; second abscissa of cubitus longer than recurrent vein; interanal vein absent. Fifth segment of fore tarsus longer than the second or third; inner spur of middle tibia slightly shorter than basitarsus, second and fifth segments of middle tarsus about equal, the third shorter than the fifth; apex of hind tibia not thickened, tibial spur about 0.60 as long as the basitarsus, basitarsus shorter than the remaining tarsal segments combined, second segment longer than the fifth, and third and fifth about equal; hind tarsal claws pectinate basally. *Abdomen*. First abdominal suture extending obliquely forward laterally; second tergite slightly shorter than the third medially; hypopygium about as long as the second to fourth

segments of hind tarsus combined, and plowshare-shaped; ovipositor sheath (fig. 1A) about as long as the first two segments of hind tarsus combined, pubescent.

Male. Essentially similar to the female.

The type female, CORDOVA, MEXICO; and two paratypes, one female and one male, MEXICO (Academy of Natural Sciences of Philadelphia); the paratype female has second abscissa of cubitus and recurrent about equal. One male, MEXICO (U. S. National Museum).

Cardiochiles noctis, new species

Female. Length 7 mm. Black, outer and upper parts of inner orbit ferruginous; apical half of mandible dark reddish; spur of fore tarsus dark ferruginous; eye grayish-black. *Head.* Antenna 35-segmented; scape and pedicel shining, with longer pubescence than the flagellum; eye bare; ocelli slightly elevated; vertex shining, and slightly sloping toward frons; frons shining, impressed, and with a median longitudinal carina; face with a short median ridge above, below which there is a more or less triangular elevation; clypeus with its basal margin slightly elevated medially, its apical margin truncate and slightly arched inward and not notched; temple and eye about equal in dorsal view; galea short. *Thorax.* Lateral face of pronotum rugose medially; median lobe of mesonotum with a slight depression along each side of the low median longitudinal elevation; notaulices distinct and foveolate; mesopleuron with upper and lower grooves foveolate, and posterior groove rather coarsely foveolate with a smooth depression at the middle anterior to the groove; metapleuron rugose with the median lower part of its anterior portion smooth; propodeum rugose, its carinae high and distinct, and propodeal spiracle ovate and elevated. First abscissa of radius longer and thicker than that of basal vein; third abscissa of radius slightly shorter than fourth; second abscissa of cubitus shorter than recurrent vein; second abscissa of submedius slightly longer than first; interanal vein represented by a short stump continued by a pigmented line. Fifth segment of fore tarsus longer than the second; inner spur of middle tibia about two-thirds as long as basitarsus, second tarsal segment slightly shorter than fifth; outer apical margin of hind tibia thickened, slightly flaring, but not forming a strong process; inner spur of hind tibia about half as long as basitarsus; basitarsus shorter than the next four tarsal segments combined, second tarsal segment longer than the fifth; tarsal claws pectinate basally. *Abdomen.* First abdominal suture slightly curved cephalad to the margin; second tergite shorter than the third; hypopygium plowshare-shaped, about as long as the first three tergites combined; ovipositor sheath (fig. 1B) with short pubescence except at base, about three-fourths as long as the hypopygium.

Male. Essentially similar to the female, but the propodeal carinae low or not distinct.

Type. Female, MEADOW VALLEY, MEXICO. C. H. T. Townsend (U. S. National Museum, No. 57296). *Paratypes.* Four females and three males apparently collected at the same locality by the same collector.

CARDIOCHILES ORNATUS (CRESSON), new combination

Toxoneuron ornatum Cresson, 1873. *Canad. Ent.*, 5:66, 69, ♂.

The following redescription is from the type.

Male. Length 6 mm. Head lemon-yellow; thorax and abdomen light brownish-yellow; eye grayish-black; flagellum brown; the following parts black: tubercle on the medium upper part of face; a spot on frons including ocelli, and from this a narrow band extending to summit of each eye and then to occiput; lower part of proepisternum; posterior median margin of lateral face of pronotum; two broad vittae on median lobe of mesoscutum separated by a narrow median line, and one broad vitta on each lateral lobe of mesoscutum; tegula; mesoscutellum except lateral and posterior margins; a u-shaped band between lower and posterior grooves on upper half of mesopleuron; mesosternum; a large spot and a small one laterally, and a large spot ventrally, on hind coxa; a spot on each side of first tergite posteriorly; tergites 3 to 7 except for narrow apical margins; inner side of hind femur and tibia. Wings yellowish, veins and stigma pale brown, or brownish-yellow. *Head.* Antennae incomplete; scape and pedicel with longer pubescence than the flagellum; eye hairy; ocelli slightly elevated, the distance between the two posterior ocelli longer than that between either one of them and the anterior ocellus; frons impressed, smooth, shining, with a median longitudinal carina; face punctate, slightly depressed medially, and with a short median tubercle above; clypeus punctate, its apical margin notched at the middle; temple broader than the eye in dorsal view; galea short. *Thorax.* Lateral face of pronotum smooth and shining; notaulices moderately foveolate, deep; mesopleuron shining, upper groove punctate, lower groove weakly foveolate, and posterior groove shallowly foveolate; metapleuron rugose, median ventral part of its anterior portion and anterior part of its posterior portion smooth and shining; propodeum somewhat plain, all carinae high and distinct and spiracle transverse. First abscissae of radius and basal vein about equal, but the former thicker than the latter; third abscissa of cubitus slightly shorter than the fourth; second abscissa of cubitus and the recurrent vein about equal; interanal vein absent. First segment of fore tarsus longer than the second; inner spur of middle tibia slightly shorter than basitarsus and fifth tarsal seg-

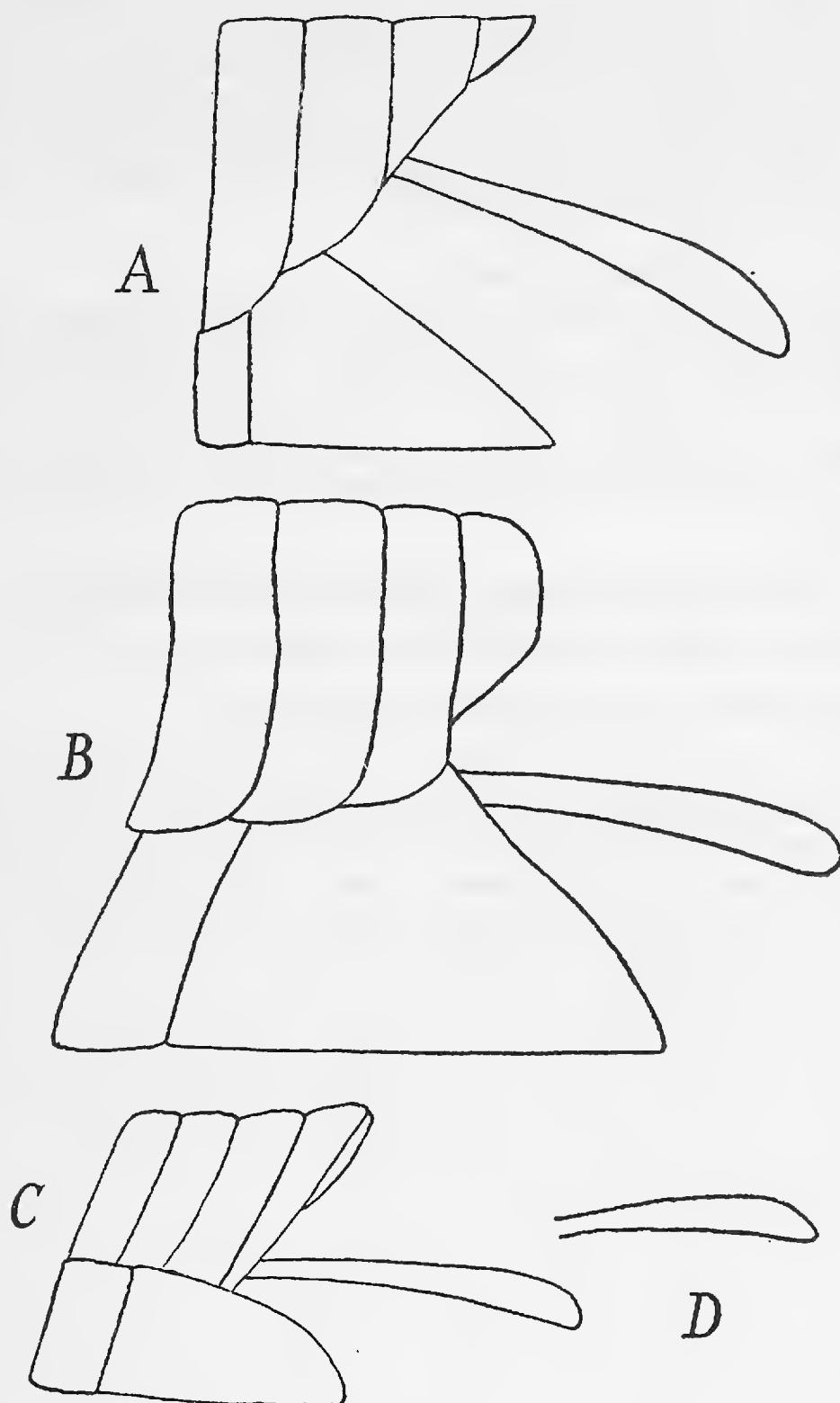


FIGURE 1

Apex of abdomen and ovipositor sheath of *C. mexicanus* (A), *C. noctis* (B), *C. orizabae* (C). Ovipositor sheath of *C. thoracicus* (D).

ment longer than second; apex of hind tibia not thickened, its inner spur about three-fourths as long as basitarsus; posterior basitarsus about as long as the other four tarsal segments combined, second tarsal segment longer than the fifth, third and fifth about equal; hind tarsal claws pectinate basally. *Abdomen*. First abdominal suture extending obliquely forward laterally; second tergite about half as long as third.

Type male, CORDOVA, MEXICO.

The type of this species was not recorded by Cresson, 1916, in "The Cresson Types of Hymenoptera" (Mem. Amer. Ent. Soc., No. 1), but the author found a specimen in the collection of the Academy of Natural Sciences of Philadelphia labeled *Toxoneuron ornatum*. It fits the description and is considered to be the type.

CARDIOCHILES ORIZABAE (CRESSON), new combination

Toxoneuron orizabae Cresson, 1873. Canad. Ent., 5:66-67, ♂.

The following redescription is from the type.

Male. Length 4.2 mm. Black; fore leg yellowish-brown, coxa trochanters and base of femur black, apex of tibia, tibial spurs and tarsus dark yellowish-brown; knee of middle leg yellowish-brown; wings light fuliginous. *Head*. Antenna 30-segmented; eye hairy; ocelli slightly elevated; vertex about as long as frons, smooth, shining; frons impressed, smooth, shining, and with a low median longitudinal carina; face smooth, shining, and with a short median tubercle above; clypeus smooth, shining and with its apical margin notched at the middle; temple and eye about equal in dorsal view; galea short. *Thorax*. Lateral face of pronotum wrinkled medially on anterior half; notaulices finely foveolate; mesopleuron smooth, shining, upper and lower grooves finely foveolate, posterior groove coarsely foveolate, with a smooth, curved groove from the middle leading anteriorly to the lower groove; metapleuron rugose, median ventral part of its anterior portion smooth and shining; propodeum rugose, carina moderately distinct and high, spiracle ovate and situated before the middle of the spiracular area. First abscissa of radius longer and thicker than that of basal vein; fourth abscissa of cubitus about 1.50 times as long as the third; second abscissa of cubitus and recurrent vein about equal; interanal vein represented by a pigmented line. Fifth and second segments of fore tarsus about equal; inner tibial spur of middle leg about as long as basitarsus, second tarsal segment longer than fifth, and third and fifth about equal; apex of hind tibia not thickened, inner tibial spur about two-thirds as long as basitarsus, which is about as long as the next three tarsal segments combined, second tarsal segment longer than the third, and third longer than the fifth; hind tarsal claws pectinate basally.

Abdomen. First abdominal suture extending obliquely forward laterally; third tergite slightly over 1.50 times as long as the second.

Female. Essentially similar to the male. Hypopygium about as long as the hind basitarsus, plowshare-shaped and its median ventral line folded longitudinally; ovipositor sheath (fig. 1C) about as long as the first three segments of hind tarsus combined, and pubescent.

Type male, ORIZABA, MEXICO (Academy of Natural Sciences of Philadelphia); one female, CORDOVA, MEXICO, F. Knab (U. S. National Museum).

CARDIOCHILES THORACICUS (CRESSON), new combination

Toxoneuron thoracicum Cresson, 1873. *Canad. Ent.*, 5:68, ♀.

Toxoneura thoracica Ashmead, 1894. *Proc. Ent. Soc., Wash.*, 3:49, 51, ♀ ♂.

The following redescription is from the type.

Female. Length 4.5 mm. Head ferruginous; antenna, lower end of the cheek, and lower end of face between cheek and clypeus black; eye grayish-black; apical margin of clypeus dark ferruginous; thorax, abdomen and legs black; pronotum, proepisternum, mesonotum, tegulae, upper part of mesopleuron, apical third of fore femur, and fore tibia and tarsus, ferruginous; wings fuliginous. *Head.* Antennae incomplete, scape and pedicel with longer pubescence than the flagellum; eye hairy, ocelli elevated; vertex smooth, polished, and flat; frons smooth, polished, distinctly impressed, and with a median longitudinal carina; face slightly less than twice as wide as long, smooth, polished, its median line slightly elevated, and with a very indistinct short median ridge above; clypeus about 1.50 times as wide as long, smooth, polished, and notched on apical margin at the middle; temple broader than the eye in dorsal view; malar furrow about 0.75 as long as the basal width of mandible; galea short. *Thorax.* Median portion of the lateral face of pronotum rugose; median lobe of mesoscutum without a longitudinal impression on each side of the median line; notaulices foveolate; mesopleuron smooth, polished, its upper and lower grooves foveolate and its posterior groove rather coarsely foveolate with a short smooth impression from the middle leading to the lower groove; anterior portion of metapleuron smooth and polished and posterior portion rugose, anterior half plain; propodeum rugose, carinae high and distinct, and spiracle ovate, situated before the middle of the spiracular area. First abscissa of radius 1.50 times as long as that of basal vein; third abscissa of cubitus shorter than the fourth; recurrent vein slightly longer than the second abscissa of cubitus and about one-half as long as the second abscissa of basal vein; nervulus postfurcal by about 0.33 its own length; interanal vein absent. Second and fifth segments of fore tarsus about equal; apex of hind tibia not thickened

and expanded into a flaring process; inner spur of middle tibia longer than the basitarsus, second and fifth tarsal segment about equal; inner spur of hind tibia about 0.80 as long as the basitarsus, basitarsus shorter than the last four tarsal segments combined, and second and third tarsal segments longer than the fifth; hind claws pectinate basally. *Abdomen*, First abdominal suture extending obliquely forward laterally; second tergite slightly shorter than the third medially; ovipositor sheath (fig. 1D) about 0.67 as long as the abdomen.

Male. Essentially similar to the female; a transverse black band on vertex between eyes; clypeus notched rather strongly.

Type female, CORDOVA, MEXICO, and a male labeled MEXICO (Academy of Natural Sciences of Philadelphia). One male from Arizona recorded by Ashmead is not in the U. S. National Museum collection.

NESTING HABITS OF *ANDRENA RHODOTRICA* LINSLEY (Hymenoptera-Andrenidae)

Andrena rhodotricha was originally described from specimens collected by G. E. Bohart and the writer at Berkeley, California¹. It has subsequently been taken by C. D. Michener on *Salix*. On March 14, 1939, this species was found nesting in a perpendicular five foot bank on the south side of Dwight Way Hill, Berkeley. The burrows were constructed among the large basal roots of a California laurel growing on the top of the bank. The burrow entrances were all within four to five inches of each other and were frequently hidden by roots or cracks in the ground. They were 5 mm. in diameter and penetrated the moist clay soil as a smooth circular hole for from three to six inches. Numerous cells were constructed along each burrow and were seldom more than an inch away from those in the same or adjacent series. All of the bees had emerged and several females had constructed fresh burrows, the cells of which were waxed, and provisioned with a spherical ball of pollen measuring 5 mm. in diameter. The eggs were white, slightly bowed, and 3 mm. long by less than 1 mm. wide. This species was also found nesting at the Orinda Crossroads, Contra Costa County, in February, 1940. The mature bees were unemerged and were taken from cells among the roots of a California buckeye at the top of a six foot bank.—J. W. MACSWAIN.

¹ Linsley, E. G. 1939. New species of andrenid bees from California. *Pan-Pac. Ent.*, 15:155-162.